

# Office of Hydrologic Development Hydrologic Software Engineering Branch Quarterly Activity Newsletter January 1, 2006

*Software for NWS Hydrology!*

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## **1. HIGHLIGHTS FOR October, November and December 2005**

One OB5 and two OB6 interim releases for NWSRFS were issued during August and September. Meanwhile the NWSRFS team focused on design and development of our OB7 projects, one of which is subject to the NWS OSI Process (OSIP), and the rest of which are subject to OHD's internal OSI Process (HOSIP). OB7 tasks are also now subject to the new AWIPS software development process. Some CHPS-related tasks made progress this quarter.

AWIPS development, deliverable, and installation work schedules continues to evolve according to the details of the new AWIPS contract. As reported in a page available via: [https://www.ops1.nws.noaa.gov/Secure/awips\\_software.htm](https://www.ops1.nws.noaa.gov/Secure/awips_software.htm), the OB5 installations are essentially complete. The Release OB6 software has been delivered to a limited number of beta sites, including one RFC (NWRFC). The "OB6.FINAL" release is scheduled for field deployment starting on February 1, 2006. An OB6.x follow-up release is being considered, but no final schedule has been released.

Besides support activities for OB5 sites and OB6.0 beta sites, efforts are focused on OB7 development, primarily for the upgrades to the Multi-Sensor Precipitation Estimator (MPE) suite of applications and an enhancement of the HydroView station data display capabilities.

The NEXRAD RPG Build 9 work continued on schedule. Build 9 is focused on an RPG refresh, migrating the RPG hardware and software from a Sun Solaris platform to a PC Linux environment, and is scheduled for operational deployment in early 2007. Meanwhile, efforts in support of Dual Polarization (target Build 11, deployment expected late 2008) continued this quarter. The highlight was a VTC-based workshop conducted by NSSL in Silver Spring on December 1; more details below.

The planning, budgeting, execution, and tracking of HSEB activities are becoming more complex. Some of the reasons are the implementation of a new organizational structure in OHD/HSEB, the ongoing but expanded management of AHPS (Advanced Hydrologic Prediction System) tasks using HOSIP (Hydrologic Operations Services Improvement Program), more formal tracking activities associated with the new AWIPS contract, and an increased focus on AWIPS planning activities via the SREC (Software Recommendation and Enhancement

Committee). Although some of the information is outdated, web sites for HOSIP, AHPS, and SREC are:

<https://bestpractices.nws.noaa.gov/contents/hosip/>  
[http://www.nws.noaa.gov/oh/rfcdev/projects/ahps06\\_charter.htm](http://www.nws.noaa.gov/oh/rfcdev/projects/ahps06_charter.htm)  
<http://sec.noaa3.awips.noaa.gov/srec/>

As part of these management mechanisms, there are expectations imposed on the HSEB customers - our NWS field offices. We encourage and appreciate the involvement of all local and regional offices in the task planning and review, some of which are conducted outside of the HSEB. This feedback plays a critical role in helping HSEB understand your task priorities and the specific requirements of your tasks.

On the HSEB Government personnel front we made some progress this quarter on trying to fill our two Hydrologist vacancies. We completed all the paperwork necessary in November to advertise to fill behind Scott VanDemark (who retired in May 2005) and Edwin Welles (who left in June 2005). Unfortunately, some new and changed Human Resources processes have delayed those advertisements. The GS-1315-14 vacancy, to become our fifth Project Area Leader, did open on December 20 and will stay open until January 18. The GS-1315-13 vacancy has yet to hit the street.

## **2. DETAILS OF TASKS**

### **2.1. NEXRAD SOFTWARE DEVELOPMENT**

Visit our web page: <http://www.nws.noaa.gov/oh/hrl/hseb/nexrad.htm>.

Level III radar precipitation product specifications for the RPG are available on OHD's website: [http://hsp.nws.noaa.gov/oh/hrl/wsr88d\\_prods/index.htm](http://hsp.nws.noaa.gov/oh/hrl/wsr88d_prods/index.htm).

#### **2.1.1. RPG BUILD 9**

OHD's internal testing is almost complete; documentation is being prepared for HOSIP Gate 4 and for the NEXRAD Integration Readiness Review (IRR) expected in January. The software will be handed off to OOS/ROC on January 31, 2006 for integration and system testing.

#### **2.1.2. OTHER NEXRAD DEVELOPMENT NEWS**

**Dual Polarization:** The Dual Polarization project is tracked via the NWS OSIP (visit <https://osip.nws.noaa.gov/osip/index.php>).

The HSEB NEXRAD project team continued to support the Dual Polarization project through regular meetings led by the project manager (Greg Cate, OS&T/PPD) and the

OSIP Integrated Work Team (IWT) Leader (Roger Hall, OS&T/PPD). The project successfully passed OSIP Gate 2 at the end of November, and is now in Stage 3.

NSSL conducted a VTC-based workshop in Silver Spring on December 1, to share knowledge of their Hydrometeor Classification Algorithm (HCA) and new Precipitation Algorithm with implementers and integrators. NSSL is in the process of readying their algorithms for final analysis and implementation. OS&T will be implementing the HCA; OHD will be implementing the Precipitation Algorithm.

HSEB's Project Area Leader (PAL) in charge of Dual Polarization (Chris Dietz) volunteered to form and lead a new cross-organizational working group, whose goal will be to develop a Dual Polarization RPG-based software design via collaborative efforts between OHD, OOS/ROC, NSSL, OS&T, and the FAA.

**TDWR PPS:** A meeting between OHD and OS&T resulted in the decision to have OHD proceed with development of a TDWR-based Hybrid Scan product (e.g., DHR) for further evaluation. The product will not be viewable on AWIPS since it isn't clear how operationally useful (or accurate) such a product might be due to the quality of the base data. OHD science branch staff will evaluate real-time products resulting from HSEB's initial implementation, to provide input for future requirements development. We completed a draft Need Identification Document (NID) and Statement of Need (SON) for this new HOSIP project.

## **2.2. AWIPS RELEASE OB5.X**

AWIPS software development in HSEB is currently divided into two general categories: NWS River Forecast System (RFS) software, and the "other" software, which includes the WFO Hydrologic Forecast System (WHFS), the Precipitation Processing software, and the Data Ingest Software. Web pages are available that provide support information for both these categories, each site relates to multiple AWIPS builds for the software category.

Refer to the OCWWS/HSD web pages for release notes and other relevant documentation:

-- for RFS Support: [http://www.nws.noaa.gov/os/water/RFC\\_support/index.shtml](http://www.nws.noaa.gov/os/water/RFC_support/index.shtml).

-- for WHFS Support: <http://www.nws.noaa.gov/om/whfs/>

### **2.2.1. NWSRFS**

There were no interim releases for the OB5-R26 software during this period.

We have provided support to HSD to troubleshoot problems which have been identified by users and several new bugs have been uncovered.

### **2.2.2. WHFS/IHFS DATABASE**

The following are a few of the OB5 highlights, mostly repeated from previous newsletters:

- a) Numerous enhancements were made to the Site-Specific application and to the TimeSeries application, including requested changes from the Western Region.
- b) The Station Observation Display (a.k.a. Data Display) feature currently in HydroView/MPE will be implemented within the D2D application. For the first time, this allows overlay of station data from the IHFS database onto D2D. This task was performed by the OST/MDL development group using the data retrieval “engine” provided by OHD, coupled with a new D2D user interface. Unfortunately, we have received reports of some major problems with this feature in D2D. We encourage users of this software to report problems through the proper support channels.
- c) HydroView/MPE is able to display dam locations from the DamCREST database, and allows user selection of a dam and direct access to invoke the DamCREST application for the given dam.

### **2.2.3. PRECIPITATION PROCESSING**

- a) An overhaul in the way that gage precipitation estimates are handled in the WHFS OB5 will ensure that all software has consistent algorithms for deriving precipitation accumulations and will improve the speed of the precipitation data processing. Please refer to previous newsletters for more information.

With this change, the PostAnalysis application for integrating 24-hour precipitation reports with gridded hourly products was unfortunately rendered unusable. HSEB has completed a rapid-delivery project to update the application to allow its operational use at RFCs. This will also allow the application to be supported in an OB6 environment, with evaluation of the updated application currently underway at OHRFC.

- b) The MPE operations are being modified to allow individual grids to be turned off, as per local office wishes. Currently, MPE produces 8 QPE grids, some of which are independent of other grids (e.g., radar-only mosaic), others of which are dependent (e.g., local bias multi-sensor mosaic). By turning off unwanted grids, the MPE FieldGen operation will be completed more quickly and disk space usage is minimized.
- c) The Radar Climatology (RADCLIM) software suite was incorporated into the national software baseline and delivered with AWIPS for the first time. These applications are used to generate radar climatology “maps” for use in the precipitation processing, so that the “best” radar is chosen (if coverage exists) when multiple radars cover a given area. This software requires local collection of historical radar data.

### **2.3. AWIPS RELEASE OB6**

The primary purpose of this build is to port our applications to the PostgreSQL database and to the new RHEL 3 operating system. OB6.0 is currently in an extended beta test phase. The remaining sites will receive OB6 in the form of the release entitled ‘OB6.FINAL’, which

begins deployment February 1, 2006. Deployment to all NWS sites will take approximately 5 months.

The Red Hat Enterprise Linux Workstation Basic Version 3 Update 4 (RHEL3u4) is the operating system for AWIPS Release OB6 for all systems except the RAX, which stays at Red Hat 7.2. The OB6 install is performed in three phases. The first phase is the PowerVault relocation, the second phase is the upgrade to RHEL 3u4, and the third phase is the conventional installation of OB6.

The PostgreSQL database and RHEL upgrade may have some impact on local scripts or methods. Also, there may be some impact from changes to the AWIPS COTS (Commercial-Off-The-Shelf) software. Please coordinate with your office or Regional focal point if you have questions on the status of the AWIPS COTS (Commercial-Off-The-Shelf) software.

### **2.3.1. NWSRFS**

We issued two interim releases for the OB6-R27 software during this period due to the discovery of this problem during early AWIPS beta testing of OB6 at NWRFC:

#### a) XSETS

(HSD bug r27-1) Corrected a memory fault which was sometimes generated when trying to access data from the PostgreSQL database.

#### b) XNAV

(HSD bug r27-1) Corrected a memory fault which was sometimes generated when trying to access data from the PostgreSQL database.

### **2.3.2. WHFS/IHFS DATABASE**

The bulk of the OB6 work consisted of the transition of the OHD HSEB software from using an Informix DBMS on HP-UX servers to using a PostgreSQL DBMS on Linux workstations. This change affected both the IHFS database and the DamCREST database. As part of the OB6 installation, the Informix data are automatically moved into the PostgreSQL rendition of the two databases.

Besides the PostgreSQL conversion, a few features are new to OB6 and include the ability to view MPE hourly grids in D2D; to include flow-based impacts in RiverPro; to assign proper durations to AWOS METAR precipitation data that have unique sensor reset times; to better control duplicate data SHEFdecoder posting; and to display Contingency data in TimeSeries.

The HydroGen (Hydrograph Generator) function, which replaces the RivDat local application, is being provided as part of the national AWIPS baseline in OB6. At WFOs, this software extracts the pertinent data and transfers it to the regional web server, where

complementary software creates the time-series and other web-ready files for display via the Rivers tab in the [www.weather.gov](http://www.weather.gov) web page.

The national VTEC implementation for the “hydro-VTEC” turn-key has been delayed for all offices. A new schedule has not been announced. Release OB6.0 has the changes necessary to support VTEC, but most of these features will go unused until VTEC is mandated for hydro products. Release OB6 of RiverPro includes additional changes to match the latest NWS 10-1703 and NWS 10-922 directives. One noteworthy change affects WFOs negatively. The OB6 version of RiverPro assumed that VTEC would be mandated and uses a new method to determine which forecast points to include and which product category to generate. This new method is based on the assumption that VTEC events are being issued. Without previous products with VTEC event issuances, the new method can not determine when an FLS product should be recommended, so it recommends an FLW if flooding is occurring or forecast, and an RVS otherwise. HSD WHFS support staff is working with offices to address this unfortunate transitional situation.

OB6 also includes additional RiverPro changes to ensure compatibility with the workstation test mode operations to be introduced in OB6. With this feature, an AWIPS workstation is designated to be in Operational, Test, or Practice mode, and the formatter applications respond accordingly.

Lastly, the WHFS “oper” user cron which, prior to OB6, was implemented on the DS systems, will be re-distributed so that data ingest operations are scheduled on the DX system and data processing operations on the PX. The OB6 Modification Note (Installation Procedure) and System Managers Manual discusses this further.

### **2.3.3. PRECIPITATION PROCESSING**

A major change in OB6 involved adding the ability to display locally generated MPE output in D2D. To support this, the GRIB product generation code was moved in OB6. Its directory location is controlled via updated national application token values. RFCs should review a new script which supports transmission of the GRIB products, in order to add locally selected destinations such as the NPVU NCEP destination.

An overall summary of the HSEB QPE activities is given as a supplement at the end of this newsletter (please see pages 13 through 16 below).

## **2.4. AWIPS RELEASE OB7**

### **2.4.1. NWSRFS**

We are still in the development phase for AWIPS OB7. Software handoff is scheduled to occur in May 2006. Aside from general bug fixes, items targeted for OB7 include:

- a) Verification

New functionality will include new graphical displays. The calculation of confidence intervals has been postponed to a later release to allow additional research on the calculations. Design of the GUIs is well underway. Sample screens have been coordinated with field representatives and revisions have been made based on their comments.

b) Conversion of OHD's RAX software to RHEL/PostgreSQL

The RAX will be converted to RHEL 4 in OB7 and the database engine will be converted to PostgreSQL version 7.4.8

We have completed a conversion script for use during the AWIPS OB7 upgrade, but are unable to test it completely on our development systems here. OCWWS HSD has agreed to let us test the conversion script on their NHOR system.

On December 20 HSEB conducted an AWIPS design review for this project. OS&T will review the details we provided to assess the projected impact on the system as a whole. Design reviews are a requirement for inclusion in OB7. We await final OS&T approval.

HSEB continued to work closely with Julie Meyer at MBRFC to coordinate conversion of field-written applications which execute on the RAX and also access the database. We conduct monthly telephone conferences to monitor progress and identify issues.

c) Distributed Hydrologic Modeling (DHM)

New distributed hydrologic modeling techniques will be introduced into RFC operations. DHM is being tracked via OSIP as project 04-007 "Operational Implementation of Distributed Hydrologic Modeling". Visit the OSIP website for more information (<https://osip.nws.noaa.gov/osip/index.php>).

We are making good progress on the design and code for the DHM project, re-using as much previously developed code as possible to mitigate risk and limit additional cost. We have also added another software developer to the team.

The project leader, Lee Cajina, successfully navigated this project through OSIP Gate 3 in mid-October.

There is some concern in the field about the limited usefulness of DHM in its first release (OB7). Due to lack of AWIPS resources, we were unable to secure GSD (formerly FSL) commitment to develop GFE grid editing capabilities in the OB7 timeframe. Instead, grids generated by the Distributed Hydrologic Model will be viewable - but not editable - via D-2D in OB7. As an interim measure, ABRFC recently agreed to share with WGRFC an enhanced XDMS (a locally developed application not in the AWIPS baseline) to meet their joint needs. Meanwhile HSEB will work proactively with AWIPS via the SREC to secure a GFE-based grid editing capability for OB8. Similarly, WGRFC

and ABRFC have agreed to work with their Southern Region SREC advocate and contact other Regional SREC advocates.

d) Historical Data Browser (HDB)

The HDB will be ported to run on Linux (at the moment it only runs on HP-UX), interfacing with the new PostgreSQL database. The HDB is based on old AWIPS software called the Shared Window Server, which does not run on Linux. We are currently developing a new design and experimenting using existing operational software written by HSEB's MPE developers.

e) Rivers, Reservoirs and Snow (RRS) Pre-Processor

As an initial delivery of CHPS Data Service capability, we were hoping to deliver a revised RRS pre-processor that could obtain its input observation data from the IHFS Database rather than from the fs5files in a manner consistent with the new CHPS architecture. However, a re-direction of CHPS Data Service work toward DHM has forced HSEB to put this task on hold temporarily. We had chosen RRS as an example application to prove the ability to build a functioning CHPS Data Service. We have achieved that goal. Now we are trying to aim the resultant Data Service work toward the biggest bang for the buck, DHM. Also, it is becoming clear that even though we have proved that we can entirely wrap an application (i.e., RRS) using the CHPS Data Service components, this may not be the smartest application to complete the wrapping exercise. It is probably more economical in the long run to re-write the basic RRS logic as a CHPS Algorithm Service than to wrap it. This may be true for several of the NWSRFS data pre-processors as we move them toward accessing their input data directly from the IHFS Database.

A release of the revised RRS was previously targeted for AWIPS OB7. However, recently we were briefed on all of the nuances of the new AWIPS software development process and we determined that the new process requirements would represent a change in scope for the task. Therefore this task was removed from OB7.

#### **2.4.2. WHFS/IHFS DATABASE**

Changes to the WHFS for OB7 include the implementation of the "Mapper" station data display function into WHFS, which currently operates as a local application used primarily in the Western Region. It provides a robust method for displaying hydrometeorological data, in many ways similar to the existing WHFS TimeSeries and HydroView station data display control functions. Its benefits are in its more direct methods for displaying desired data sets (i.e., less clicking), its time-stepping features, and its speed of display. Implementation of Mapper functionality into WHFS will allow the existing local application, which is dependent in part on the Western Region HydroMet system, to be retired.



Work is continuing on improved river and event monitoring tools. This includes an automated application for monitoring differences between river forecast and observations to better identify unreliable forecasts such as when QPF forecasts are inaccurate. This monitoring tool would fit within the existing WHFS Alert/Alarm functionality. A complementary interactive monitoring application is also being developed which would monitor not just observed-forecast differences, but observed and forecast values compared against thresholds, the receipt of observed and forecast data, the active state of any ongoing VTEC events, etc. This application is intended to run continuously, with an automated refresh of color coded tabular information to identify alert/alarm conditions.

### **2.4.3. PRECIPITATION PROCESSING**

Please refer to the newsletter supplement for a detailed discussion of the HSEB QPE tasks. Some of this information related to OB7 is also mentioned below.

Development work was completed for incorporating the ABRFC P3 application into MPE operations. Improvements include improved management of user polygon edits in gridded precipitation fields and the generation of another local bias field based on a triangulated grid with double interpolation adjustments. This activity will be delivered to all offices in OB7. Bryon Lawrence and Ram Varma of HSEB visited ABRFC in October, 2005 to demonstrate the merged application. Some remaining issues were identified and are being coordinated between HSEB and ABRFC.

Major design and development work is ongoing for incorporating the DailyQC functions used in the Western Region into MPE operations. The goal is to provide a nationally-supported and baselined application used by all offices to perform QPE operations. Initial changes will be provided in the OB7 release.

HSEB is also working to coordinate the delivery of RFC-generated QPE products to the SBN for subsequent receipt and use at WFOs. Changes are being coordinated to make these RFC QPE products displayable in D2D at WFOs, to complement the locally generated QPE products which can be displayed in D2D as of OB6.

## **2.5. DEVELOPMENT SUPPORT ACTIVITIES**

### **2.5.1. NEW SOFTWARE ARCHITECTURE**

Preparations for design and development of a Mean Areal Temperature (MAT) CHPS Architecture Shell took shape during this quarter, as the contract task with RTi was awarded. The purpose of this effort is to develop an architecture shell for a new NWSRFS MAT data pre-processor. By the end of this quarter the contractor had slipped the schedule by one month. We are working closely with RTi to address the issue.

The Ensemble Streamflow Prediction (ESP) component of the NWSRFS, originally selected as a pilot project to develop the first CHPS Control Service, has been put on hold partially due to a lack of Government personnel oversight resources and partially because

there are technical problems with designing the overall CHPS Control Service too early compared to other services work needed.

Phase 2 of the contract task to refine and extend The Hydrology XML Consortium (HydroXC) moved ahead well this quarter. A survey of the RFCs' XML usage and thoughts for the future was completed. A report is pending. The contractor maintained contact with the HydroXC members, added members, and obtained more data examples to refine the schema to version 2. The contractor also modeled the output data of dynamic wave routing models (e.g., FLDWAV and DamBreak) to create HydroXC-compliant XML. The contractor reports a considerable increase in HydroXC member interest and enthusiasm this quarter as Phase 2 has commenced. They are preparing a presentation for HL Management to outline various HydroXC opportunities that are presenting themselves now.

The external project to provide RFCs access to the USACE Reservoir Simulation (ResSim) model from NWSRFS continued progress this period. Rob Hartman, HIC at CNRFC, is leading the way in engaging OHD and USACE's Hydrologic Engineering Center (HEC) in a joint project to provide this linkage, funded entirely by the Yuba County California Water Agency (YCWA). Rob finalized details of the agreements, and we are now waiting for DoC clearance for NOAA to sign the contract and give OHD the go-ahead to begin work.

### **2.5.2. UNCHEDULED AWIPS RELEASE ACTIVITIES**

In this section we try to capture activities that are occurring that do not necessarily have an AWIPS release identified as yet.

- a) Work continues on the design and development of the first iteration of Streamflow Regulation Accounting (SRA) tool enhancements to the RES-J operation that will enable the RFCs to model basins with complex reservoir operations and water diversions which they cannot model at this time. A HOSIP Gate 2/3 Review meeting was held on December 21 to approve the Concept of Operations (CONOPS) and project plan.
- b) Re-implementation of the Interactive Calibration Program (ICP) is underway. Re-implementing the ICP into a better design with better documentation and more structured code will enhance the ability of the NWS OHD to support and extend this calibration tool. A CONOPS and project plan have been drafted and submitted to HOSIP in preparation for a Gate 2 review.
- c) As mentioned in the QPE supplement, work is scheduled for sometime later in FY06 to add a new satellite-radar-gage product to the growing suite of multi-sensor products in MPE.
- d) A new simplified TimeSeries feature is planned for WHFS applications. It is hoped to have this feature in some "application" release after OB7.0, but before OB8.0.

This feature, dubbed “TimeSeriesLite” would be accessible from most WHFS applications, including RiverPro, the new River Monitor tool, and assorted HydroView windows such as the Point Data Display feature, the Alert/Alarm Data Viewer, the Questionable/Bad Data Viewer, etc. This TimeSeriesLite feature would be a much scaled-down version of the current WHFS Time Series feature. It would not allow editing, not support predefined time-series group definitions, have limited scaling options, etc.

- e) Early planning is underway for the eventual migration of HydroView functionality into D2D, which will occur sometime after Release OB7.

### **2.5.3. AWIPS BETA TESTING**

The VTEC (Valid Time Event Coding) and NWSI 10-922 features of RiverPro will be tested at field sites sometime in the 2006. The schedule has been complicated by the implementation of the new AWIPS contract, remaining issues with other AWIPS formatters for hydro VTEC products, and adjustments to VTEC policy.

The ABRFC is evaluating an updated MPE application with P3 functionality. Because this version requires the OB6 PostgreSQL database server, it is limited to a non-baseline AWIPS system at ABRFC. Upon formal delivery of OB6, the capability to evaluate the integrated application under full operational scenarios will be available.

### **2.5.4. AWIPS SYSTEM CHANGES**

As should be known to all by now, the PostgreSQL DBMS will be used by the hydrologic applications as of Release OB6. The PostgreSQL web site <http://www.postgresql.org> and an HSEB web site <http://www.nws.noaa.gov/ohd/hrl/hseb/postgreSQL/index.htm> provide helpful information in managing this transition. The HSEB has also been active in supporting the NWS Training Center course for PostgreSQL understanding.

All OHD database software will use PostgreSQL in AWIPS Release OB6 except the software on the RFC Archive server machine (RAX) which will continue with Informix for OB6 (more on that below). Field offices which have local database software must be ready when AWIPS OB6 arrives. OHD has provided downloadable scripts to convert a site's current IHFS database to OB6/PostgreSQL. A tar file containing the OB6/PostgreSQL version of software has been available for download for sites that need to test their local applications with a real-time data feed.

For OB7, the AWIPS Software Engineering Group (SwEG) has adopted numerous changes to the AWIPS COTS software. These include changing to the RHEL4u2 operating system version, the GCC 3.4.3 compiler, PostgreSQL 7.4.8 database server.

## **2.6. HYDROMETEOROLOGICAL AUTOMATED DATA SYSTEM (HADS)**

Visit our web page at: <http://www.nws.noaa.gov/oh/hads/>.

### **2.6.1. HADS SOFTWARE**

HADS software modules have required little modification during the past several months. The only notable modification involved testing for the occurrence of certain pseudo-binary characters within raw DCP messages. At times, certain “out of range” characters are up-linked after the data segment of a DCP’s message and we had to ensure that these characters would not interfere with accurate message decoding.

### **2.6.2. HADS DATA NETWORK**

The number of defined sites in the HADS network is nearing 12,000 as more data providers enter into the GOES DCS environment. Along with the new co-operators, many existing DCPs are being switched to High Data Rate (HDR) platforms and are up-linking data more frequently. At this time last year there were 3,791 DCPs sending data on an hourly basis ... today the number is 5,011. The most notable newcomer to the GOES DCS community is NOAA’s National Estuarine Research Reserve System (NERRS). The unique aspect of this data collection operator is that they are relying solely on HADS to acquire, process and deliver their water quality and meteorological data to their operating units.

### **2.6.3 HADS, the RFCs and OB6**

The implementation of a new method and delivery path for the back-up feed of HADS products to the RFCs continues. In the OB6 environment, these files are delivered via Secure Copy (scp). To date, Northwest, Southeast and West Gulf RFCs have been converted to the scp process.

When the need arises, please contact Brian Jackson in order to set-up the new delivery path required by OB6.

## **January 2006 Newsletter Supplement:**

### **HSEB QPE Task Summary**

(December 30, 2005)

Mark Glaudemans, QPE Software Project Leader

This newsletter supplement describes tasks related to the QPE vision for the NWS. All of the tasks that HSEB has recently completed, is working on, or is planning to work on in FY06 are described here. There are other organizations outside OHD/HL/HSEB that are also working on NWS QPE issues, such as OHD/HL/HSMB (“Science” branch), OST/MDL (FFMP activities), and NSSL. These tasks are only briefly discussed in this supplement. QPE tasks are coordinated in OCWWS/HSD through the AHPS Flash Flood Services Theme Team.

The primary OHD QPE activities for HSEB are:

#### **1. Make RADCLIM (Radar Climatology) operations part of the AWIPS baseline**

The RADCLIM software provides for interactive analysis of historical radar data in order to generate estimates of the precipitation climatology based solely on radar measurements. The resulting grids are used by the MPE algorithms to determine which radar data to use, particularly when there are multiple radars which cover a given grid bin. These grids were computed 5+ years ago, but with a longer archive radar data set, updated re-computation of these grids should be considered.

This task consisted of significant re-engineering of code, and production of a full documentation set. The applications and documentation are available in AWIPS Release OB5. To perform the RADCLIM analysis, RFCs must obtain the archived radar data sets.

#### **2. Integrate ABRFC P3 functionality and MPE**

This task has been a major task for the HSEB in FY05 and is a key part of the overall vision for integrating the three primary operational QPE tools used in the NWS (i.e. MPE, P3, DailyQC) into a single integrated interactive application, with an integrated suite of supporting utility applications. These applications are to be incorporated into the AWIPS baseline.

In Fall 2005, we completed beta testing of the integrated MPE/P3 application at ABRFC. We are working with ABRFC to investigate a few remaining issues. This application will be included in AWIPS OB7. This integration task consisted of incorporating new grid generation methods, including a new local bias algorithm. The new grid types are selectable from the ever-growing suite of MPE grids. It also includes a significantly improved set of polygon editing tools. This task is tracked through the AHPS quarterly reports and thru the HOSIP process, with documents available for review.

#### **3. Integrate the Western Region DailyQC functionality and MPE**

This is a major development task for HSEB in FY2005 and FY2006. In Summer 2005, we hosted Craig Peterson from CBRFC, who installed and demonstrated the DailyQC (DQC) software. We are currently designing and developing the many components of DailyQC with MPE in a spiral development fashion.

For the OB7 release delivered to AWIPS in February 2006 and fielded in October 2006, the HSEB will deliver HydroView and MPE as two applications – i.e. the HydroView/MPE application is being split into two applications. The HydroView application will have the ability to display the hourly “best estimate” grids generated by the MPE Field Generator, and which have been possibly edited interactively using the MPE application. HydroView will no longer be able to edit the data, nor to display the full suite of multi-sensor grids that result from MPE operations. The now separated MPE application contains these features. The initial release of the new OB7 MPE application will contain some new menu options related to DQC.

Because the resulting application is separate from HydroView, and will include integrated P3 and DQC applications, HSEB is considering renaming the MPE application to reflect its expanded scope. A free lunch is being offered to anyone who offers a catchy, descriptive acronym or name for the application (some suggestions include: QPEmapper, Multi-sensor Multi-variate QC tool [MMQC], MPQC).

Development will proceed beyond the OB7 February code handoff. Many DQC functions are being implemented which are new to MPE, including: the integrated management of the 1-6-24 hour duration data, the use of quality control levels instead of tags, the management of temperature and freezing level data, the estimation of missing station data, built-in computation of MAP values, additional QC tests, and enhanced station data editing tools. We will be working with WR RFCs to evaluate the new application during FY06. Changes made after February will be provided in the earliest possible AWIPS release. This integration task is also being tracked via AHPS and HOSIP.

#### **4. Include legacy Post-Analysis code into integrated MPE**

The Post-Analysis application allows for the “day after” review of 24 hour observer data and adjustment of the corresponding one-hour gridded estimates. The idea is that the observer data set complements and fills in data voids present in the original analysis which can then be applied to produce an improved set of precipitation estimates.

This task has two parts: one short-term and interim in nature, the second is the permanent solution. In brief, the legacy Post-Analysis function was rendered unusable in OB5. As per Eastern Region requests, a fast-track task has recently been completed to restore the legacy functionality. The application is currently being reviewed at OHRFC. It will be available for use until the long-term solution is adopted. The long-term solution is to incorporate it directly into MPE as part of the integrated DailyQC/P3/MPE application.

#### **5. Addition of the multi-sensor satellite-radar-gage grid into MPE**

This task involves the creation of another new gridded product to the MPE suite of products. It would be the first MPE product to quantitatively use satellite, radar, and rain-gage data. The process would first mosaic the local bias corrected radar field with a local bias corrected satellite field to produce a new radar-satellite mosaic field. This grid would then be merged with rain gage data. The local bias corrected fields in the first step would be corrected using gage data, so in effect the gage data are used twice - once to adjust the radar and satellite data in the first step, and then to merge the resultant data directly with gage values in the second step.

This task ranked high in the FY06 AHPS Flash Flood theme team planning. We plan to complete it sometime during the FY06 period, and deliver it to operate within AWIPS. This is an AHPS and HOSIP project, with documents available that discuss the scientific approach for this task.

## **6. Provide support for MPE output in AWIPS D2D**

We have a long-term strategy to manage the changes in QPE operations. This includes the integration of the DailyQC/P3/MPE apps into a single application, which will produce a "best" hourly QPE grid. The MPE application, now and in the future, is expected to run at both the RFCs and WFOs. Note that the output from MPE operating at WFOs, whether or not it is quality controlled, is responsible for the bias information sent on to the NEXRAD precipitation processing system.

For OB6, GSD (a.k.a. FSL) and OHD have worked together to provide for the display (but not editing) of these best estimate QPE grids within D2D. This is limited to only displaying the grids generated at the host office, whether it is a WFO or RFC.

Because RFC's QPE grids are of higher quality due to the increased QC they perform on the data, we are working to provide the ability for WFOs to receive and display RFC QPE grids in D2D for AWIPS OB7. The WFOs would still be able to generate their grids locally. An additional task will allow the RFC(s)-generated grids to be designated as the "best estimate" grid used at the WFO for applications such as the SiteSpecific headwater model. This requires functions that mosaic the grids from multiple RFCs servicing a WFO, and then cropping the mosaic to fit the WFO area of interest.

In OB8, the HSEB plans to work with GSD and various NWS offices to move the full HydroView functionality into D2D, including the ability to display (but not edit) precipitation and other station data.

## **7. Other Tasks Related to QPE**

There are other tasks being worked on outside of OHD/HL/HSEB which are related to QPE. In no particular order, a probably incomplete mention of each is given below.

Distributed modeling components for NWSRFS are being delivered in OB7 which require gridded QPE as input. The QPE grids generated using MPE applications will be available for input into the distributed model processing.

HSMB staff is on a team working to plan for QPE issues related to the Analysis of Record (AOR) approach, which relates to the overall NWS QPE concept of operations.

Other AHPS projects which are being worked on in HSMB include additional methods for performing automated gage quality control and for generating multi-sensor grids at sub-hourly resolution and using a grid size smaller than the 4km HRAP grid. Improvements to radar-based estimates of precipitation are also being studied involving probabilistic QPE, dual polarization, terminal doppler weather radar, and the multi-sensor precipitation nowcaster.

OHD is also working with NSSL as part of the NMQ/Q2 project to produce real-time multi-sensor estimates of precipitation. Details on the operational implementation regarding the hosting of the analysis functions and distribution of the resulting products are not available at this time.

OST/MDL recently enhanced the FFMP application to make use of the special FFG data for use in debris flow monitoring. FFMP is being modified in order to make use of gridded QPE independent of the traditional radar-only processing it performs. Initially, the gridded data being considered is the Q2 data, with provisions being considered for future use of sub-hourly MPE grids.

Currently, RFCs send their QPE to the existing National Precipitation Verification Unit at <http://www.hpc.ncep.noaa.gov/npvu/>. A new web site that provides user-manageable graphical displays of QPE and allows downloads of formatted numerical QPE has been introduced at: [http://www.srh.noaa.gov/rfcshare/precip\\_analysis\\_new.php](http://www.srh.noaa.gov/rfcshare/precip_analysis_new.php). The OHD QPE tasks and this precipitation analysis web site are both considered to be integral parts of the larger vision for NWS QPE operations. The enhanced ability to disseminate the RFC QPE grids to external destinations such as this web site and the improved grid generation and manual QC tools, are all part of the goal that the resulting RFC QPE grids represent the official best estimate QPE.